

# Recommendations to Improve Targeted Vaccination Coverage Among High-Risk Adults

Task Force on Community Preventive Services

## Introduction

Influenza, pneumococcal disease, and hepatitis B—three vaccine-preventable diseases—continue to cause significant morbidity and mortality among adults in the United States. Efforts to reduce infection, illness, and death from these diseases depend on increasing vaccination coverage in the population, especially among adults at high risk of infection or complications. Risk factors for infection or complications of infection vary for each disease, but include occupational, behavioral, and health conditions.

Influenza infection is associated with occupational (healthcare) and environmental (residential care) conditions involving close contact with at-risk populations.<sup>1</sup> Morbidity and mortality are highest among people aged  $\geq 65$  years, but are also high among younger adults who have medical conditions, such as pulmonary disease, diabetes, or heart disease, that place them at risk for complications.<sup>2-4</sup> The case fatality rate (377/100,000) among adults aged 44 to 64 with two or more risk conditions is significantly higher than the case fatality rate (9/100,000) for people aged  $\geq 65$  years of age without risk conditions.<sup>5,6</sup>

Invasive pneumococcal disease causes  $>5000$  deaths every year in the United States.<sup>7</sup> Risk factors for complications of infection are similar to those for influenza, including age and chronic illnesses such as diabetes, heart disease, and lung disease.<sup>2-4</sup> The case fatality rate among younger adults (aged 18 to 64) with risk conditions is estimated to be more than twice that of younger adults with no risk conditions (12.1% and 5.4%, respectively).<sup>8</sup>

Hepatitis B virus (HBV) infection is a cause of both acute and chronic hepatitis, and infection is associated with risk behaviors and occupational exposure. Reported cases of HBV declined 76% in the United States from 1987 to 1998.<sup>9</sup> Approximately 1.25 million people in the United States have chronic hepatitis B infection.<sup>10,11</sup>

An estimated 73,000 new HBV infections occurred in 2003.<sup>10</sup> The most commonly reported risk factors for

hepatitis B infection include heterosexual activity (39.8%), sexual activity between men (14.6%), and injection drug use (13.8%).<sup>9</sup> Injection drug use was reported in 14% of people with acute hepatitis B.<sup>9</sup> HBV infection is also an occupational exposure risk associated with both routine and emergency care delivered by health, rescue, and law enforcement personnel. The number of HBV infections among healthcare workers declined significantly in recent years from 17,000 in 1983 to 400 in 1995.<sup>12</sup>

The recommendations in this report represent the work of the independent, nonfederal Task Force on Community Preventive Services (Task Force). The Task Force is developing and expanding *The Guide to Community Preventive Services (Community Guide)* with the support of the U.S. Department of Health and Human Services in collaboration with public and private partners. The Centers for Disease Control and Prevention provides staff support to the Task Force for development of the *Community Guide*.

This report provides recommendations from the Task Force on the use of population-based interventions to improve the coverage of influenza, pneumococcal polysaccharide, and hepatitis B vaccines in a variety of high-risk adult populations (targeted vaccinations). The indications for vaccination for each of these targeted vaccines are presented in the accompanying evidence review.<sup>13</sup> Task Force recommendations are based primarily on the effectiveness of interventions (alone and in combination) as determined by a standardized systematic review process.<sup>14</sup> The evidence on which these recommendations are based is provided in the accompanying article.<sup>13</sup>

These reports complement and expand on an earlier evidence review of interventions to improve coverage of universally recommended vaccines for adults, adolescents, and children.<sup>15,16</sup> Although the current review focuses on improving vaccination coverage among high-risk (targeted) populations, readers are encouraged to consult the earlier review on the effectiveness of efforts to improve vaccination coverage for influenza and pneumococcal polysaccharide vaccines, which are universally recommended for adults aged  $\geq 50$  and  $\geq 65$ , respectively. Recommendations from the earlier Task Force review are reproduced in Table 1. The recommendations in the current review were based primarily on review of intervention studies conducted

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**Table 1.** Recommendations of the Task Force on Community Preventive Services for population-based interventions to improve universally recommended vaccination coverage<sup>15</sup>

Intervention	Recommendation
<b>Interventions to increase community demand for vaccinations</b>	
Client reminder/recall	Recommended
Multicomponent interventions that include education	Recommended
Vaccination requirements for childcare, school, and college attendance	Recommended
Community-wide education when used alone	Insufficient evidence to determine effectiveness <sup>a</sup>
Clinic-based education when used alone	Insufficient evidence to determine effectiveness <sup>a</sup>
Client or family incentives	Insufficient evidence to determine effectiveness <sup>a</sup>
Client-held medical records	Insufficient evidence to determine effectiveness <sup>a</sup>
<b>Interventions to enhance access to vaccination services</b>	
Reducing client out-of-pocket costs	Recommended
Expanding access in healthcare settings	Insufficient evidence to determine effectiveness <sup>a</sup> when implemented alone Recommended as part of a multicomponent intervention
Vaccination programs in WIC settings	Recommended
Home visits	Recommended
Vaccination programs in schools	Recommended <sup>b</sup>
Vaccination programs in childcare centers	Insufficient evidence to determine effectiveness <sup>a</sup>
<b>Provider- or system-based interventions</b>	
Provider reminder/recall	Recommended
Assessment and feedback for vaccination providers	Recommended
Standing orders	Adults: Recommended Children: Insufficient evidence to determine effectiveness <sup>a</sup>
Provider education when used alone	Insufficient evidence to determine effectiveness <sup>a</sup>

<sup>a</sup>Insufficient evidence to determine effectiveness means that we were not able to determine whether or not the intervention works.

<sup>b</sup>Recommendation revised by Task Force on Community Preventive Services, 2002.

WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

among adults aged <65 with medical conditions such as diabetes, heart disease, and lung disease; healthcare workers at high risk for occupational exposure; and people with high-risk behaviors for HBV infection such as multiple sex partners or injection drug use.

### Healthy People 2010 Objectives and 2000–2005 National Immunization Program Goals

Relevant targeted vaccination objectives described in the national prevention agenda, *Healthy People 2010*,<sup>17</sup> and vaccination coverage goals of the National Immunization Program<sup>18</sup> are shown in Table 2. Interventions reviewed and recommended by the Task Force provide options for communities and healthcare systems to reach or surpass these goals.

### Information from Other Advisory Groups

The *Guide to Clinical Preventive Services* documents the effectiveness of vaccination in preventing disease among individuals and provides general recommendations for clinical practice.<sup>19</sup> Recommendations about the administration of adolescent and adult vaccinations are published by the Advisory Committee on Immunization Practices (ACIP),<sup>20,21</sup> the American College of Physicians,<sup>22</sup> Infectious Diseases Society of America,<sup>22,23</sup> the American Academy of Family Physicians,<sup>24</sup> and the American College of Obstetricians and Gynecologists.<sup>25</sup>

Reviews and recommendations from the Task Force on Community Preventive Services on interventions to improve vaccination coverage also complement previ-

**Table 2.** *Healthy People 2010*<sup>17</sup> and National Immunization Program (NIP) 2000–2005<sup>18</sup> objectives related to targeted vaccination coverage rates among high-risk populations

Vaccine	Target population	HP2010 objective	NIP objective
Influenza	Ages 18–64	60% (objective 14–29c)	60%
Pneumococcal polysaccharide	Ages 18–64	60% (objective 14–29d)	60%
Hepatitis B	All high risk		90%
	Long-term hemodialysis patients	90% (objective 14–28a)	
	Men who have sex with men	60% (objective 14–28b)	
	Occupationally exposed workers	98% (objective 14–28c)	

HP2010, *Healthy People 2010*; NIP, National Immunization Program.

**Table 3.** Recommendations of the Task Force on Community Preventive Services on population-based interventions to improve vaccinations of adults aged <65 years at risk for influenza, pneumococcal disease, and hepatitis B disease due to medical conditions, occupational exposure, or risk behaviors (targeted vaccinations)

Intervention	Recommendation
<b>INTERVENTIONS WHEN IMPLEMENTED ALONE</b>	
<b>Interventions to increase demand for vaccines</b>	
Client reminders	Insufficient evidence to determine effectiveness <sup>a</sup>
Clinic-based client education	Insufficient evidence to determine effectiveness <sup>a</sup>
Community-wide education	Insufficient evidence to determine effectiveness <sup>a</sup>
Client or family incentives	Insufficient evidence to determine effectiveness <sup>a</sup>
Vaccination requirements	Insufficient evidence to determine effectiveness <sup>a</sup>
<b>Interventions to enhance access to vaccination services</b>	
Expanding access in healthcare settings	Insufficient evidence to determine effectiveness <sup>a</sup>
Reducing out-of-pocket costs	Insufficient evidence to determine effectiveness <sup>a</sup>
<b>Provider- or system-based interventions</b>	
Provider reminders	Recommended
Provider assessment and feedback	Insufficient evidence to determine effectiveness <sup>a</sup>
Provider education	Insufficient evidence to determine effectiveness <sup>a</sup>
Standing orders	Insufficient evidence to determine effectiveness <sup>a</sup>
<b>INTERVENTIONS WHEN IMPLEMENTED IN COMBINATION</b>	
Menu format (see details in Table 4)	Recommended

<sup>a</sup>Insufficient evidence to determine effectiveness means that we were not able to determine whether or not the intervention works.

ous summaries and recommendations conducted by the Canadian Community Health Practice Guidelines Working Group,<sup>26</sup> ACIP, and the National Vaccine Advisory Committee.<sup>27</sup>

## Recommendations

The Task Force evaluated the evidence on effectiveness of 11 selected interventions to improve influenza, pneumococcal polysaccharide, and hepatitis B vaccination coverage rates of adults who are at risk due to medical conditions, occupational exposure, or behaviors. Recommendations from the Task Force are presented in Table 3 and discussed below.

The interventions selected for review are conceptually organized into one of three categories:

- Interventions that increase community or client demand for vaccines
- Interventions that enhance client access to vaccination services
- Interventions that increase or improve healthcare provider or system administration of vaccination services (provider- or system-based interventions)

Interventions were reviewed alone (single component) and in combination (multicomponent).

In its earlier review of universally recommended vaccines, the Task Force summarized the evidence on effectiveness of interventions implemented in combination within defined multicomponent categories (e.g., multicomponent interventions that include education).<sup>15</sup> The body of evidence summarized in the current reviews consisted predominantly of studies evaluating unique, overlapping combinations of interventions. A multicomponent framework was initially devel-

oped in these reviews, but the Task Force later determined that a simplified, qualitative, and conceptual categorization of interventions within a “menu” format provides a more accurate and useful assessment of the evidence. This approach introduces an additional qualitative method for Task Force recommendations, while acknowledging the work of previous investigators who developed and implemented intervention combinations based on a conceptual understanding of vaccination demand and delivery.<sup>28</sup>

## Interventions Implemented Alone

### Increasing Community Demand for Vaccinations

Interventions that increase demand for vaccinations are designed to increase knowledge of, and demand for, vaccination services. The interventions selected for review were client reminders, clinic-based client education, community-wide education, client or family incentives, and vaccination requirements (laws or policies).

**Client reminders: Insufficient evidence to determine effectiveness.** Client reminder interventions involve reminding members of a target population that vaccinations are due. Reminders differ in content, and are delivered by various methods including, but not limited to, telephone, letters, or postcards. The Task Force found insufficient evidence to determine the effectiveness of this single-component intervention in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults because only one study, with fair quality of execution, was identified.

**Clinic-based client education: Insufficient evidence to determine effectiveness.** Clinic-based client education interventions provide information to clients served in a specific medical or public health clinic setting. Examples of educational interventions include the use of small media (e.g., posters, brochures, videos, and newsletters) and group educational activities (e.g., classes or lectures). The Task Force found insufficient evidence to determine the effectiveness of clinic-based client education when implemented alone in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage in high-risk adults, because only two studies, both with fair quality of execution, were identified.

**Community-wide education: Insufficient evidence to determine effectiveness.** Community-wide education interventions provide information to most or all of a target population in a geographic area. Educational messages can be delivered by various methods such as mail, radio, television, newspapers, or posters. The Task Force found insufficient evidence to determine the effectiveness of community-wide education when implemented alone in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults because no studies were identified.

**Client or family incentives: Insufficient evidence to determine effectiveness.** Client or family incentives involve motivating clients with rewards (e.g., money or discount coupons for retail stores) or the threat of penalties (e.g., being excluded from participating in a program). A review of the available scientific evidence identified one qualifying study of the effectiveness of client incentives when implemented alone in improving targeted vaccine coverage. The single study evaluated the effectiveness of monetary incentives in increasing hepatitis B vaccination of high-risk clients (injection drug users). Clients who were offered incentives demonstrated a large and significant increase in vaccination rates. No qualifying studies of the use of client incentives in improving vaccination coverage for influenza or pneumococcal polysaccharide vaccines were identified. The Task Force found insufficient evidence to determine the effectiveness of client or family incentives when implemented alone in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage in high-risk adults because only the one study, with fair quality of execution, was identified.

**Vaccination requirements: Insufficient evidence to determine effectiveness.** These laws or policies require vaccination or other documentation of immunity as a condition of attendance (child care, school, or college), residence (residential or long-term care facilities), or employment (health care). The Task Force

found insufficient evidence to determine the effectiveness of vaccination requirements when implemented alone in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults because no qualifying studies were identified.

### **Interventions to Enhance Access to Vaccination Services**

Interventions that enhance access to vaccination services are designed to reduce the costs or increase the convenience of obtaining vaccinations. The interventions selected for review were expanding access in healthcare settings and reducing client out-of-pocket costs for vaccination.

**Expanding access in healthcare settings: Insufficient evidence to determine effectiveness.** Expanding access increases the availability of vaccines in medical or public health clinic settings in which vaccinations are offered by (1) reducing the distance from the setting to the population; (2) increasing or changing hours during which vaccination services are provided; (3) delivering vaccinations in clinical settings in which they were previously not provided (e.g., emergency departments, inpatient units, or subspecialty clinics); or (4) reducing administrative barriers to obtaining vaccination services within clinics (e.g., developing a “drop-in” clinic or an “express lane” for vaccination services). The Task Force found insufficient evidence to determine the effectiveness of this intervention in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults because no studies of the effectiveness of this intervention were found.

**Reducing out-of-pocket costs: Insufficient evidence to determine effectiveness.** Healthcare system efforts to reduce clients’ out-of-pocket costs for vaccination services include paying for vaccination or administration, providing insurance coverage, or reducing co-payments for vaccinations at the point of service. The Task Force found insufficient evidence to determine the effectiveness of reducing out-of-pocket costs when implemented alone in improving influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults, because no studies were identified.

### **Provider- or System-Based Interventions**

These interventions are implemented primarily through healthcare systems with the goal of reducing missed opportunities for vaccination. The interventions selected for review were provider reminders, provider assessment and feedback, provider education, and standing orders.

**Provider reminders: Recommended.** Provider reminder interventions inform those who administer vaccinations that individual clients are due for specific vaccinations.

Techniques for delivering reminders range from using notations, prompts, or stickers in clients' charts to standardized checklists generated by the clinical staff or from computer databases and registries. Reminders can be directed to primary healthcare providers or to one or more members of the clinic staff.

The Task Force recommends provider reminders on the basis of strong evidence of effectiveness in improving targeted vaccination coverage. Reviewed studies focused on influenza and pneumococcal polysaccharide vaccines. Although the review did not include an evaluation of the effectiveness of provider reminders when implemented alone in increasing targeted vaccination for HBV, the recommendation should be considered applicable to this vaccine as well. Additionally, the findings should be applicable to providers and staff in most healthcare settings where improvements in coverage are needed. We did not find any economic evaluations of provider reminder systems or any harms associated with use of these systems.

**Assessment and feedback for vaccination providers: Insufficient evidence to determine effectiveness.** Provider assessment and feedback involve evaluating the performance of providers in delivering one or more vaccinations to client populations and giving this information to providers. The Task Force found insufficient evidence to determine the effectiveness of this intervention when delivered alone in increasing influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults, because only one study, with fair quality of execution, was identified.

**Provider education: Insufficient evidence to determine effectiveness.** Provider education seeks to increase providers' knowledge and change their attitudes about vaccinations, to get them to deliver more of the appropriate vaccinations to their clients or to improve their interactions with clients so that clients are more willing to accept vaccinations. Information can be delivered through printed materials, videos, lectures, continuing medical education programs, and computerized software. The Task Force found insufficient evidence to determine the effectiveness of provider education when implemented alone in increasing influenza, pneumococcal polysaccharide, or hepatitis B vaccination coverage among high-risk adults because no studies of this intervention were found.

**Standing orders: Insufficient evidence to determine effectiveness.** Standing orders allow professionals who are not physicians (e.g., nurses, pharmacists) to prescribe or deliver vaccinations to client populations by protocol without direct physician involvement at the time of the interaction. The Task Force found insufficient evidence to determine the effectiveness of standing orders when implemented alone in increasing influenza, pneumococcal polysaccharide, or hepatitis B

**Table 4.** Menu format of intervention combinations recommended by the Task Force on Community Preventive Services based on evidence of effectiveness in multicomponent studies included in this review

<b>Recommended intervention combinations to increase targeted vaccination coverage</b>	
One or both of these <b>interventions to enhance access to vaccination services:</b>	Expanded access in healthcare settings Reducing client out-of-pocket costs
<b>PLUS</b>	
One or more of these <b>provider- or system-based interventions:</b>	Standing orders Provider reminder systems Provider assessment and feedback
<b>AND/OR</b>	
One or both of these <b>interventions to increase client demand for vaccination services:</b>	Client reminder systems Client education

vaccination coverage among high-risk adults because no studies of this intervention were found.

### **Interventions Implemented in Combination**

**Interventions to increase vaccine coverage when implemented in combination: Recommended.** Most of the available evidence on effectiveness identified in our reviews of interventions to increase targeted vaccine coverage came from studies that evaluated multicomponent interventions. These studies evaluated a wide variety of intervention combinations. To make a recommendation for use of these multicomponent interventions, we developed a "menu" approach (Table 4), which is explained in detail in the accompanying article.<sup>28</sup> On the basis of strong evidence of effectiveness, the Task Force recommends the combination of one or more interventions to enhance access to vaccination services (expanded access in healthcare settings, reduced client out-of-pocket costs) with at least one provider- or system-based intervention (standing orders, provider reminder systems, provider assessment and feedback), and/or at least one intervention to increase client demand for vaccination (client reminders, client education).

These findings should be applicable to most clients and providers, in most settings where improvements in coverage are needed. No additional benefits or harms of these interventions implemented in combination were identified, although any such effects of single-component interventions may remain relevant in combination. We found no qualifying evaluations of the economic impact of these interventions.

## Interpreting and Using the Recommendations

Evidence reviews can support, but do not replace, the need to conduct local assessments. Recommendations from the Task Force can assist program planners in matching effective intervention options to local needs, experience, administrative and social structures and regulations, and resources. In addition to the evidence on effectiveness, evidence about applicability can be used to assess the extent to which the interventions reviewed might match a particular local situation. Economic evaluations of the recommended interventions and intervention combinations are, unfortunately, limited in both quality and quantity.

The evidence on effectiveness identified in this review addresses three different vaccines, a number of targeted populations, and a variety of community and healthcare settings. Despite some limitations in the body of evidence, the Task Force recommendations presented in this report, except as noted below, should be broadly applicable. Although few studies of population-based interventions to increase vaccination coverage for hepatitis B among healthcare workers were identified, for example, the Task Force recommendation reflects confidence that effective efforts to increase coverage among healthcare workers for influenza are potentially applicable.

On the other hand, community-based options for interventions to increase vaccination coverage of people at high risk for HBV remain one very important area in which significant gaps remain in the evidence on effectiveness. The Task Force notes that efforts to address significant differences in the hepatitis B vaccination requirements (a series of three injections), the target populations (people with high-risk behaviors such as injection drug use), and the settings for intervention (limited access to health care and healthcare settings) have not been evaluated in depth within the published literature and are unlikely to be successful through the application of unmodified healthcare system strategies developed for use with other populations and settings. A research agenda is presented in the accompanying evidence review.<sup>13</sup>

In 2000, the Advisory Committee on Immunization Practices (ACIP) updated their universal recommendation for annual influenza vaccination to include adults aged 50 to 64 years.<sup>29</sup> Program planners dedicated to increasing influenza vaccination coverage within this “new” population should consider recommendations from either or both Task Force reviews to be applicable. For initial efforts, program planners may find that the recommendations in the original review of universally recommended vaccines<sup>15</sup> provide a number of effective and flexible intervention options. Planners attempting to enhance initial program efforts may find the information on intervention combinations recommended in this targeted review helpful.<sup>13</sup>

A number of the studies included in these reviews of targeted vaccination strategies evaluated interventions or combinations of interventions implemented to increase vaccine coverage among all adult patients within a healthcare system (including both patients with universal and those with high-risk indications). To match effective interventions to local needs, program planning should include an assessment of existing disparities, if any, in vaccine coverage among adult patients with universal and targeted indications.

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